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SOME PINEAPPLE PROBLEMS.

1st ARTICLE. - INTRODUCTION.

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LITERATURE.- Those who first began to grow pineapples on a commercial scale in Porto Rico twenty to twenty-five years ago, followed experience gained in Florida or directions given in publications from there. The first two bulletins on pineapples published by the Florida Agricultural Experiment Station in 1894 and 1896 are short and not of general interest today. The next one, Bulletin No.50 (1899) is comprehensive and Farmers' Bulletin No.140 (1901), U. S. Department of Agriculture, written by the same author, gives a general review of the knowledge of pineapple growing at that date. In the period 1903 to 1910 six bulletins on pineapple culture were published by the same station dealing with soils, fertilizers, varieties and marketing. A later account of conditions in Florida is given in Farmers' Bulletin No.1237 (1921).

In Hawaii the commercial development of the pineapple industry had reached considerable dimensions in 1908 according to a Press Bulletin of the Hawaii Agricultural Experiment Station of that year. Several bulletins dealing with pineapples have been issued by the same station since that time, most of them on the subject of manganese in the soil, which seems to be the main problem in Hawaii. The subject is well treated from a research standpoint in Bulletin No.28 (1912) and later experience with it, including a remedy, is given in Bulletin No.52 (1924).

In Porto Rico the study of pineapple growing by members of the Station staff was undertaken shortly after the station was established. Bulletin No.8 (1909) gives a general summary of conditions as they appeared at that time. Special problems were recognized, but it was not possible to solve them then because of other work needing immediate attention. One of these problems, the calcareous soils, was attacked shortly after and the results published in Bulletin No.11 (1911).

COMMERCIAL IMPORTANCE IN PORTO RICO. - In the annual report of this Station for 1904 the production of Cabezona pineapples at Palmarejo is stated to have been 140,000 fruits at that time. The cultivation at that place dates back fifty years or more. It is restricted to a few hills and at this date pineapples are cultivated on those same hills with a production more or less as it was twenty years ago. The Cabezona variety was also tried by early planters on the coastal plain from Rio Piedras to Arecibo, but it was soon discarded as the Red Spanish was found to be preferable. At present the Cabezona is again being planted on a limited scale and experience shows that it can be grown successfully wherever the soil conditions are favorable.

The Red Spanish has so far been the commercial variety, but the development has not been as fast as conditions warrant. In 1910 277,000 boxes were exported and the export increased gradually the next five years, reaching 552,000 boxes in 1915. It then dropped gradually to nearly 141,000 in 1920, but it is again increasing, being over 270,000 in 1924. The reason for the above fluctuations as well as for the slow development in general is a lack of understanding of a number of problems. It is not due to low returns in general for it is admitted by all who are well informed that the pineapple is one of the most remunerative crops produced in Porto Rico, but it will bear emphasizing that a pineapple grower must be mentally awake. In order to succeed he must be ahead of his problems, for today's knowledge is not always sufficient for tomorrow's need.

UNSOLVED PROBLEMS. - Occassionally some one will say that the pineapple is less difficult to grow than other crops that are entensively cultivated in Porto Rico. Yet most growers assert that too frequently they are faced with problems that they can not solve, even after twenty years experience. This is due to differences in conditions under which the experience was gained, and one of the most frequent differences is that of soil. The grower who has been fortunate enough to plant on land that is, in all respects, suitable for pineapple growing, has usually gained money although he may not have gained much experience, but those who happened to plant on land not altogether suitable have been less successful financially while they have a lot of stored up knowledge. That knowledge is not always such that it can be profitably employed, but a person with such knowledge is at the beginning of systematic investigation, for he can at least ask intelligent questions.

The questions asked by the various growers, as well as by the writer himself, have been grouped under the following headings: (1) Why is a certain soil unsuitable for pineapple growing while that a few feet away produces fine crops? (2) How can the suitability of any soil be determined before planting? (3) How can an unsuitable soil be made suitable and how long will it take and how much will it cost? (4) Why does the average soil become unsuitable for pineapples after it has produced several crops? (5) How many years should the land be rotated and with what crops before it can again be planted with pineapples? (6) What forms and quantities of nitrogen, potassium and phosphorous are best suited for pineapples and when should the application be made? (7) What other elements are beneficial when applied to a soil that is otherwise unfit for pineapple growing? (8) Why is a slip not desirable when it appears to be so? (9) Why do a number of plants in a field bloom at a time least expected; and can blooming be controlled?

PRESENT INVESTIGATIONS. - The work conducted for the purpose of answering the above mentioned questions include the growing of plants in jars of water, in pots with pure sand or washed gravel and with different soils, as well as on field plats with different soils and with the addition of various elements. By means of the results obtained from that work correlated with results obtained in the laboratory, it has been found possible to answer some of the questions at this time. Also the indications are that it will be possible to answer all of them by continuing the work.

As the questions cover a wide range of agricultural knowledge, the answers will cover many issues of Agricultural Notes. The second question for instance: "How can the suitability of any soil be determined before planting?" will include directions for measuring soil moisture, soil aeration, reaction of the soil solution, the state of the colloidal matter in the soil and the necessity of organic matter, all of which are within the possibility of an intelligent planter and none of which can be omitted in attempting to answer the question. This will be best understood when considering the spotty condition of most fields, referred to in the second question, which may be due to any one of the above mentioned factors or to several of them combined.

Fertilizing presents a number of problems that are peculiar to pineapple plants and seemingly peculiar to Porto Rico. Among those is the one of the most appropriate form of nitrogen to use. In Florida nitrate of soda is recommended, at least for the first application and organic materials for later applications. In Porto Rico it was recognized many years since that sodium nitrate is not a desirable fertilizer for pineapples. Later some growers noticed that neither cotton seed meal nor dried blood gave desirable results. Those observations made it necessary to reopen the fertilizer question in general and the results obtained from that line of investigation are both interesting and useful. With the knowledge gained it becomes more evident than it was before that the value of a fertilizer is not to be reckoned alone in the units of nitrogen, potash and phosphoric acid it contains, but also in the action upon the soil of the elements with which these are combined. Such action, whether favorable or otherwise, would scarcely be suspected except when it is indicated by a plant as sensitive to soil conditions as the pineapple. Besides the form and combination of fertilizer elements, are the questions of amounts to be applied and time of application. It would seem unnecessary to ask these questions after so many years of practical experience as growers here in Porto Rico have had but that experience has not furnished an answer to the questions, rather it has emphasized the necessity for further research.

In the articles to follow, the various soil problems will be discussed first. The problems when important, are usually so during the first few months after planting for that is the critical period in the life of the pineapple plant. At that time the soil is especially subject to washing and leaching, and a crust readily forms on the surface which interferes with aeration. Also the plant is liable to being choked by soil washed into the heart. Dry weather on the other hand may deplete the moisture to a point beyond which the plant cannot supply itself, which moisture is lost mainly by evaporation from the soil. But after the plant becomes large enough to cover the ground, conditions are entirely changed. Washing, leaching and crusting are almost eliminated and evaporation from the soil is greatly lessened, also the plant is able to take advantage of light rains and heavy dews which are of little value to it before that time.